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## Test 727: Massey-Ferguson 85 (LPG)

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, [tractortestlab@unl.edu](mailto:tractortestlab@unl.edu)

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# NEBRASKA TRACTOR TEST 727 -MASSEY -FERGUSON 85 LPG

The University of Nebraska Agricultural Experiment Station

W. V. Lambert, Director; Lincoln, Nebraska

## POWER TAKE-OFF PERFORMANCE

Hp	Crank shaft speed rpm	Fuel Consumption		Hp-hr per gal	Temperature Degrees F			Barometer inches of mercury
		Gal per hr	Lb per hp-hr		Cooling medium	Air wet bulb	Air dry bulb	
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours								
62.21	2000	6.555	0.448	9.49	194	72	75	28.820
Standard Power Take-off Speed (540 rpm)—One Hour								
52.49	1477	5.849	0.474	8.97	194	72	75	28.918
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
55.20	2089	6.325	0.487	8.73	184	73	76	.....
1.64	2240	2.492	6.457	0.66	158	73	76	.....
28.68	2169	3.904	0.578	7.35	169	72	76	.....
63.04	1997	6.635	0.447	9.50	191	73	77	.....
14.67	2220	2.951	0.855	4.97	162	74	78	.....
42.36	2137	5.111	0.513	8.29	174	73	77	.....
Av 34.27	2142	4.569	0.567	7.50	173	73	76	28.957

## DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank shaft speed rpm	% Slip of drive wheels	Fuel Consumption		Hp-hr per gal	Temp.	Degrees F		Barometer
					Gal per hr	Lb per hp-hr		Cool- ing med	Air wet bulb	Air dry bulb	inches of mercury
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—3rd Gear											
55.03	5101	4.05	2000	7.37	6.561	0.507	8.39	179	48	61	28.965
75% of Pull at Maximum Power—Ten Hours—3rd Gear											
46.35	3965	4.38	2119	5.28	6.346	0.582	7.30	166	45	54	28.669
50% of Pull at Maximum Power—Two Hours—3rd Gear											
31.21	2577	4.54	2155	3.48	4.341	0.591	7.19	165	49	63	28.928
MAXIMUM POWER WITH BALLAST											
50.92	8666	2.20	2065	13.87	2nd Gear.....			164	41	48	28.880
56.47	5248	4.04	2001	7.59	3rd Gear.....			165	39	45	29.055
55.66	3970	5.26	1996	5.58	4th Gear.....			167	39	45	29.055
56.50	3155	6.72	1994	4.17	5th Gear.....			168	46	51	29.040
54.83	2144	9.59	1993	2.92	6th Gear.....			168	46	51	29.040
MAXIMUM POWER WITHOUT BALLAST											
53.67	5023	4.01	2093	13.35	3rd Gear.....			158	22	23	29.260
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—3rd Gear											
Pounds pull			5250	5500	5750	5800			5700	5600	
Horsepower			56.5	52.8	49.1	41.8			35.0	29.9	
Miles per hour			4.0	3.6	3.2	2.7			2.3	2.0	

## TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 15-30;6;16	Two 15-30;6;16
	—Liquid	755 lb each	None
	—Cast iron	1454 lb each	None
Front tires	—No, size, ply & psi	Two 7.50-16;6;36	Two 7.50-16;6;36
	—Liquid	80 lb each	None
	—Cast iron	465 lb each	None
Height of drawbar		22½ inches	24 inches
Static weight	—Rear	8005 lb	3588 lb
	—Front	3080 lb	1990 lb
Total weight with operator		11,260 lb	5753 lb

## Department of Agricultural Engineering

Dates of Test: November 2 to November 13, 1959

Manufacturer: MASSEY-FERGUSON INCORPOR-

ATED, DETROIT, MICHIGAN

Manufacturer's Power Rating: Not Rated

**FUEL, OIL and TIME** Fuel commercial propane Specific gravity converted to 60°/60° 0.5103 Weight per gallon 4.25 lb Oil SAE 20-20W API service classification ML, MM, MS and DG To motor 2.435 gal Drained from motor 1.357 gal Transmission and final-drive lubricant Type A transmission fluid Total time motor was operated 57 hours.

**ENGINE** Make Continental LPG Type 4 cylinder vertical Serial No EB242 202 Crankshaft mounted lengthwise Rated rpm 2000 Lubrication pressure Bore and stroke 3⅞" x 5½" Compression ratio 8.8 to 1 Displacement 242 cu in Carburetor size 1¼" Ignition system battery Cranking system 12 volt electrical Air cleaner oil washed wire mesh Muffler was used Oil filter replaceable pleated paper element Fuel filter stacked disc Cooling medium temperature control thermostat.

**CHASSIS** Type standard Serial No SBM 803559 Tread width rear 52" to 88" front 50" to 78" Wheel base 88.03" Center of gravity (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 31.08" Vertical distance above roadway 32.83" Horizontal distance from center of rear wheel tread 0" to the right or left Hydraulic control system direct engine drive Advertised speeds mph first 1.70 second 2.36 third 4.22 fourth 5.35 fifth 6.78 sixth 9.46 seventh 16.88 eighth 21.45 reverse 1.37 and 5.48 Belt pulley diam 9" face 6½" rpm 1355 Belt speed 3200 fpm Clutch single plate dry disc clutch operated by foot pedal Brakes double dry disc brakes operated by foot pedals which can be locked together Power take-off 540 rpm at 1478 engine rpm Steering power assisted Turning radius (on concrete surface with brake applied) right 115" left 115" (on concrete surface without brake) right 135" left 135" Turning space diameter (on concrete surface with brake applied) right 234" left 234" (on concrete surface without brake) right 288" left 288".

**REPAIRS AND ADJUSTMENTS** No repairs or adjustments.

**REMARKS** All test results were determined from observed data in accordance with SAE and ASAE test code.

During the limber-up run the fuel gauge was observed to function improperly. This continued throughout the remainder of the test.

First gear was not run as it was necessary to limit the pull in second gear to avoid excessive slippage. Seventh and eighth gears were not run as they were over 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No 77.

L. F. LARSEN  
Engineer-in-Charge

L. W. HURLBUT  
G. W. STEINBRUEGGE  
J. J. SULEK  
Board of Tractor  
Test Engineers

# EXPLANATION OF TEST REPORT

## GENERAL CONDITIONS

Each tractor is a production model equipped for common usage. Power consuming accessories can be disconnected only when it is convenient for the operator to do so in practice. Additional weight can be added as ballast if the manufacturer regularly supplies it for sale. The static tire loads and the inflation pressures must conform to recommendations in the Tire Standards published by the Society of Automotive Engineers.

## PREPARATION FOR PERFORMANCE RUNS

The engine crankcase is drained and refilled with a measured amount of new oil conforming to specifications in the operators manual. The fuel used and the maintenance operations must also conform to the published information delivered with the tractor. The tractor is then limbered-up for 12 hours on drawbar work in accordance with the manufacturer's published recommendations. The manufacturer's representative is present to make appropriate decisions regarding mechanical adjustments.

The tractor is equipped with approximately the amount of added ballast that is used during maximum drawbar tests. The tire tread-bar height must be at least 65% of new tread height prior to the maximum power run.

## BELT OR POWER TAKE-OFF PERFORMANCE

**Maximum Power and Fuel Consumption.** The manufacturer's representative makes carburetor, fuel pump, ignition and governor control settings which remain unchanged throughout all subsequent runs. The governor and the manually operated governor control lever is set to provide the high-idle speed specified by the manufacturer for maximum power. Maximum power is measured by connecting the belt pulley or the power take-off to a dynamometer. The dynamometer load is then gradually increased until the engine is operating at the rated speed specified by the manufacturer for maximum power. The corresponding fuel consumption is measured.

**Varying Power and Fuel Consumption.** Six different horsepower levels are used to show corresponding fuel consumption rates and how the governor causes the engine to react to the following changes in dynamometer load: 85% of the dynamometer torque at maximum power; minimum dynamometer torque,  $\frac{1}{2}$  the 85% torque; maximum power;  $\frac{1}{4}$  and  $\frac{3}{4}$  of the 85% torque. Since a tractor is generally subjected to varying loads the average of the results in this test serve well for predicting the fuel consumption of a tractor in general useage.

## DRAWBAR PERFORMANCE

All engine adjustments are the same as those used in the belt or power take-off tests. If the manufacturer specifies a different rated crankshaft speed for drawbar operations, then the position of the manually operated governor control is changed to provide the high-idle speed specified by the manufacturer in the operating instructions.

**Varying Power and Fuel Consumption With Ballast.** The varying power runs are made to show the effect of speed-control devices (engine governor, automatic transmissions, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree

turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to the pull at maximum power as possible and still have the tractor maintain the travel speed at maximum horsepower on the straight sections of the test course; (2) 75% of the pull at maximum power; and (3) 50% of the pull at maximum power. Prior to 1958, fuel consumption data (10 hour test) were shown only for the pull obtained at maximum power for tractors having torque converters and at 75% of the pull obtained at maximum power for gear-type tractors.

**Maximum Power with Ballast.** Maximum power is measured on straight level sections of the test course. Data are shown for not more than 12 different gears or travel speeds. Some gears or travel speeds may be omitted because of high slippage of the traction members or because the travel speed may exceed the safe-limit for the test course. The maximum safe speed for the Nebraska Test Course has been set at 15 miles per hour. The slippage limits have been set at 15% and 7% for pneumatic tires and steel tracks or lugs, respectively. Higher slippage gives widely varying results.

**Maximum Power Without Ballast.** All added ballast is removed from the tractor. The maximum drawbar power of the tractor is determined by the same procedure used for getting maximum power with ballast. The gear (or travel speed) is the same as that used in the 10-hour test.

**Varying Power and Travel Speed with Ballast.** Travel speeds corresponding to drawbar pulls beyond the maximum power range are obtained to show the "lugging ability" of the tractor. The run starts with the pull at maximum power; then additional drawbar pull is applied to cause decreasing speeds. The run is ended by one of three conditions; (1) maximum pull is obtained, (2) the maximum slippage limit is reached, or (3) some other operating limit is reached.

For additional information about the **Nebraska Tractor Tests** write to the **Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska.**



Massey-Ferguson 85 LPG